OBSTRUCTION OF THE CYSTIC DUCT AND ITS SURGICAL CONSEQUENCES

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Too little attention has been given to the importance of the cystic duct in acute conditions of the gall-bladder.

The complicated anatomy of the cystic duct; its many variations; its relation to other ducts, and the grave complications consequent upon its obstruction merit critical consideration.

DISCUSSION *by Dow H. Ransom, Madera; H. A. L. Ryfkogel, San Francisco; C. P. Thomas, Los Angeles; Willard J. Stone, Pasadena; and Emmet Rixford, San Francisco.*

Some of the most complicated pathology is associated with obstruction of the cystic duct, yet one rarely sees the subject discussed in the current surgical literature. The list in this complex comprises many of the most hazardous to the life of the patient of all the pathologic conditions found in the gall-bladder. Cysticus, empyema, necrotic oedema, and gangrene are in themselves sufficient to distinguish the subject as one worthy of the most serious consideration.

In this limited discussion, we can only briefly consider some of the more important factors contributing to obstruction.

The spiral form of the cystic duct, with its numerous valves of Heister which operate in the physiologic retention and discharge of the bile, are most important factors in the lodgment and ultimate impaction of an obstructing stone. When this obstruction is more or less complete, the wall of the gall-bladder develops a low resistance and septic bacteria, which may be borne to its walls through the lymph channels leading from the liver, find a culture medium favorable to their growth. Moreover, the experimental studies of Chiarolanza and of Peterman, proved conclusively that when the cystic duct was totally obstructed (ligated in their experiment) bacteria were found in abundance in the contents of the gall-bladder. The bile is absent in total obstruction, and what germicidal action it may have is not operative.

The pressure from an impacted stone may cause an oedema in the gall-bladder wall which may become necrotic in degree, a condition which is antecedent to gangrene itself. True gangrene is rarely seen, due probably to an early recognition by the surgeon of acute infection before true gangrene ensues.

In cysticus, the process of oedema never goes on to necrotic destruction. The bile is gradually excluded, for, at the beginning, the stone is acting only as a ball valve, allowing some bile to come into the bladder and escape from it. The walls are gradually thickening through this chronic process, which may cover a period of many years. Finally, the occlusion of the cystic duct becomes complete, either from impaction by the stone or, as one rarely sees, the stone has disappeared, but had produced an ulceration in the mucosa of the duct and a hyperplasia of the wall, so that a definite occluding stricture has resulted. A cystic gall-bladder may be hyperplastic or have a thin wall, depending entirely upon the amount of mucus poured out from its wall. It is always painful, and the degree of pain suffered will be dependent on the tension arising from the imprisoned mucus.

There are some cystic gall-bladders which may have been acutely infected in the beginning, but were not recognized as surgical crises, and passed back into a latent condition, in which cysticus was the terminal result.

It is conceivable that a cystic gall-bladder in the early stages of its development may, before its lymphatic system has become destroyed, develop an empyema from a flood of septic bacteria pouring into it through the lymph channels from a distant septic focus. As we have seen, this infection must come by way of the liver, and the portal circulation is the stream which bears the colonies that filter through into the hepatic lymph spaces and through them into the lymphatics of the gall-bladder. These are possibilities, but they do not represent the usual course in the development of necrotic oedema or of empyema of the gall-bladder. When we revert to the lymphatic and blood supply of the gall-bladder, we observe the anatomical arrangement by which pressure from within, from a stone which suddenly had become definitely impacted, can quickly derange or cut off the blood supply and lymph drainage, so as to favor the infection of the contents of the gall-bladder or the necrotic destruction of its wall. All the conditions favorable to infection are found present; it is only a question of the degree of virulence of the bacteria or of the obstruction to the vessels which nourish the gall-bladder. Writers are fond of finding an analogy between this pathology and that present in a necrotic vermiform appendix. But the pathologic physiology, while superficially similar, is considerably more complex in the gall-bladder.

The symptoms of calculus obstruction of the cystic duct are colicky pain, tenderness, and increasing tumor.

Riedel found jaundice in 12 to 15 per cent from pressure on the common hepatic duct. If septic infection ensues, there will be rigidity of the rectus, increasing tenderness, chills, and temperature ranging from 100 F. to 104 F., with a corresponding increase in the pulse rate.

There is a high leucocytosis, ranging from 20,000 to 30,000, with 80 to 90 per cent polymorphonuclear count. A certain percentage will have jaundice, although we have seen this complication in only three cases. Jaundice may arise from the odema extending downward toward the common hepatic duct, which, taken with the pressure of the occluding stone, may cause a long persisting jaundice and leave doubt in the mind of the operator whether a stone may not have been left in the common duct. A meddlesome exploration of the chaledochus or common hepatic duct is a doubtful procedure in acutely septic gall-bladders. And not uncommonly one finds the foramen of Winslow sealed by adhesions, with a general oedematous condition of the tissues surrounding the common ducts. An effort should always be made, however, when a jaundice is present, to discover by external finger palpation, whether a calculus is present in either of the common ducts. Diagnosis should not be difficult, but it may be found necessary to differentiate from acute perforation of the duodenum with peritonitis, or from acute right kidney infection with stone.

A few cases are recorded of an elongated vermiform appendix being attached to the gall-bladder

and becoming acutely septic, with symptoms closely simulating necrotic oedema of the gall-bladder.

Two grave complications may increase the gravity of the prognosis, which at best is usually serious in these cases: perforation of the necrotic gall-bladder and true gangrene. They are not commonly met with, but are quite possible in cases where operation is delayed. Local peritonitis with pus formation around the gall-bladder was found in two of our cases without perforation. Subphrenic abscess is imminent in perforation.

We have met with but one case of true gangrene, and in this case gangrene of the entire gall-bladder occurred. It was one of those unfortunate cases not recognized in time, although we operated immediately on being called. True gangrene of the gall-bladder is so rare, practically no cases are recorded in the literature. And it is a great credit to surgical diagnosis that this is true, for complete gangrene of the gall-bladder is a lethal condition.

The prognosis in cysticus is always favorable. Many cases of cystic gall-bladder result from removal of a single stone which has caused ulceration of the cystic duct, and after the stone is removed the gall-bladder is drained and the ulcer in healing leaves the duct tightly strictured. A cystic gall-bladder should always be removed.

The prognosis in empyema and necrotic oedema must always be conservative. These conditions constitute the most serious pathology we encounter in this region, and their complications are frequently lethal. The gall-bladder should always be removed if the condition of the patient will permit; for if not removed, and the patient survives, subsequent removal will be imperative. However, there are conditions in which drainage, under local anesthesia, is the only course which good judgment can dictate, and these bad risks cannot bear more than this.

The gravity of the emergency will justify this compromise, which can always be explained to the friends of the patient.

In conclusion, this brief discussion has been inspired by the belief that too little attention has been given to the importance of the cystic duct in the acute pathology of the gall-bladder. Its interesting and complicated anatomy, its many variations in form, course and position with relation to the choledochus and common hepatic duct, the grave surgical complications which may arise from its obstruction, all merit a critical consideration.

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DISCUSSION

Dow H. Ransom (Madera, Calif.)—There is one point which I would like to mention in addition to what Dr. Lobingier has said in his excellent symposium on biliary duct obstruction, and that is an improved incision which gives us an easy access to the gall-bladder region. This phase of the subject might be considered a little irrelevant and possibly somewhat immaterial, still, I believe a suggestion which will improve our technique and improve our results in surgery is worthy of our consideration.

The incision to which I refer was first brought to my attention in an article in the Journal of Surgery, Gynecology and Obstetrics some time in the latter part of 1917 by Dr. Seigel of St. Louis. It consists of a straight incision beginning one or two cm. below the tip of the ensiform cartilage, extending obliquely downward, terminating about four cm. to the right of the umbilicus and extending down through the external layer of the fascia of the right rectus abdominalis muscle. The fascia is then separated with the handle of a scalpel, and the muscle is retracted to the right, leaving the internal fascia exposed. This, together with the peritoneum, is next incised in a line directly underneath and corresponding to the skin incision. In my experience, this incision gives the best view of the gall-bladder, cystic and common ducts. It has the added advantages of being easily and rapidly made, allowing access to the right upper abdomen without dividing a muscle or interfering with its nerve or blood supply.

H. A. L. Ryfkogel, M. D. (516 Sutter Street, San Francisco)—In the severe acute infections of the gall-bladder, gangrene is often partial and sometimes apparently limited to the mucous membrane. In these cases I have found a procedure, suggested by C. H. Mayo, of great value. This consists in rapidly peeling out the necrotic mucous membrane, using the handle of the scalpel. It is surprising how rapidly and easily this can be done. Part of the gall-bladder may or may not be scissored away, and into the shell a drainage tube is inserted. The walls will later adhere and the remains of the gall-bladder be converted into a fibrous cord, the later removal of which is unnecessary. Where there is peritoneal infection and the patient profoundly septic, I use a coffer drain, packing any surrounding intestines and stomach with broad sheets of rubber dam, and then inserting numerous strips of iodoform gauze between the rubber dam and the infected gall-bladder and liver. The retention of the gauze will produce what Horsely terms a reversal of the lymph circulation, and the toxic lymph will flow outward instead of being absorbed.

C. P. Thomas (Consolidated Building, Los Angeles)—This most practical paper by Dr. Lobingier deals with one of the most serious conditions to which the human body is heir. While the gall-bladder is in position, whether functioning normally or otherwise, it must have an outlet, and the normal one is the best one.

When the cystic duct becomes obstructed without much sepsis, the gall-bladder becomes a large painful sac; when infected or abscessed, then perforation or gangrene supervenes, followed in a short time by peritonitis and death.

The doctor wisely says that surgery here, to be successful, must be done early, preferably before even local necrosis exists, and if done after extensive necrosis, which is really gangrene, the death rate will always be great.

There is no room for improvement in his description of the symptomatology, pathology and general course of obstructive duct troubles or their sequences, but I wish to simply make one or two suggestions about the treatment of the severely infected gall-bladder.

Where it is possible to remove the entire sac and all the badly infected portions of the cystic duct, almost any simple form of drainage will suffice, but often a complete cholecystectomy cannot be done, and it is in this class of case that a reliable and complete cofferdam effect must be provided: Simple drainage here without thorough walling off is inevitably followed by general infection, absorption, and often death.

A method I have used for keeping the necrotic or septic tissues away from the normal tissue is to surround the diseased area with a large, rather soft rubber tube an inch in diameter, notched at one end to fit over the common duct, and another larger notch or slit extending from the lower end of the tube in such a way as to allow it to surround all of the sac except the portion attached to the edge of the liver.

If the tube is cut and fitted properly it completely separates the normal from the diseased tissues.

This tube should project about one-half inch above the skin, to which it should be sutured, to prevent its slipping out.

If a small tube has been placed in the gall-bladder or duct it should come up through the big one, and can be attached to a bottle to save so much soiling of dressings.

The large tube can be removed after five or six days, and the wound allowed to close by granulation.

Hernia after this large drain is rare if the rest of the incision has been properly closed.

It is my opinion that, with this simple procedure, the death rate from the operative treatment of gangrenous gall-bladder can be very materially reduced.

Willard J. Stone, M. D. (Chamber of Commerce Building, Pasadena, Calif.)—From the medical standpoint,

it may be recalled that in probably 80 per cent of the patients who consult physicians because of indigestion, the primary cause of the disturbance does not originate in the stomach. Infection or stone of the gall-bladder, consequent or subsequent to obstruction of the cystic duct, should be borne in mind in the diagnosis of every patient with dyspeptic symptoms. Modern methods of diagnosis offer much to such patients, for if the diagnosis can be established early, the more serious remote effects mentioned by Dr. Lobingier may be prevented by the proper application of surgical skill and judgment. Indirect evidence of disturbed function or disease in this region of the abdomen, from an x-ray standpoint, may be as important to the patient as the more direct evidence of a stone seen on the films. The duodenal tube, by means of which drainage from the biliary ducts may be facilitated, is of distinct help in the diagnosis. The evidence obtained is, however, indirect. Gall-bladder drainage by the duodenal tube, as such, is a misnomer. The association of gall-bladder disease with disturbed heart function or disease occurs frequently enough in elderly patients to make the physician reasonably conservative in his advice. Many times the association may be no more than an age coincidence. On the other hand, I have not infrequently advised operation for the relief of the conditions, mentioned by Dr. Lobingier, to patients believed to be bad heart risks with gratifying results. In the hands of a competent anesthetist and skillful surgeon the risk of operation for the relief of an empyema of the gall-bladder or obstruction of the cystic duct may not be as great as procrastination, based upon the hope that the process will right itself without surgical interference.

Emmet Rixford, M. D. (1795 California Street, San Francisco)—When the gall-bladder region is explored in mild cases of gall-bladder disease, perhaps when the diagnosis is in doubt, it is common practice to consider enlargement of the lymph nodes, which lie along the common and cystic ducts as evidence of infection of the gall-bladder wall—at times justifying cholecystectomy. One should remember that there are other causes of enlargement of these lymph glands, notably, ulcer of the duodenum.

In the technique of cholecystectomy little attention is paid to the cystic artery other than to ligate it. Some one in Chicago called attention to the very considerable frequency of anomalies of this vessel which may be of serious importance. The usual course of the cystic artery is along the left or mesial side of the cystic duct. A large branch not infrequently comes off near the point of bifurcation of the bile ducts and runs up the sulcus on the right or lateral side of the gall-bladder. Occasionally, this branch is larger than the left branch, indeed, it may entirely supplant it. As this artery crosses the cystic duct, it is jeopardized if the surgeon is required to split the duct near its mouth. In one case in which I operated, this artery was larger than the ordinary radial artery.

More important is the not rare condition in which the hepatic artery is small or is absent, and the cystic artery—one or both branches—carries on its function of nourishing the liver. In such case ligation of the cystic artery, as ordinarily performed, will bring about acute atrophy of the liver with generally fatal result.

For several years I have taken the precaution to feel for the pulsation of the hepatic artery along the hepaticus, and if it is absent, take pains to preserve the cystic artery.

Statutory Exemption of Religious Healers—"Most of the acts regulating the occupation of healing the sick contain provisions for exempting from their scope the practice of religious tenets or the beliefs of ministrations of any church. Many of these exemptions are illogical, ill-founded in necessity, and offensive to one's sense of substantial justice," says H. E. Kelly of the Chicago bar, in an excellent dissertation on the regulation by law of the occupation of healing diseases of human beings (Federation Bulletin). "If they go merely to the exemption of the free exercise and enjoyment of religious profession or worship under the constitution they are unnecessary, because such constitutional rights prevail regardless of statutory enactments. Most of these provisions undoubtedly are inserted because those who promote them know that their alleged religious exercises are not protected by the constitution as the enjoyment of religious profession or worship."

THE IMPORTANCE OF EARLY DIAGNOSIS IN OXYCEPHALY AND ALLIED CRANIAL DEFORMITIES, WITH REFERENCE TO THE PREVENTION OF BLINDNESS AND OTHER SEQUELAE *

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True synostosis of the coronal sutures does not normally occur until advanced adult life.

Cranial deformity appears to be the mechanical resultant of the growth and expansion of the brain acting upon a skull which can expand only in certain directions.

The origin of the condition is probably a profound defect of the germ plasm.

It is difficult to tell in what proportion of cases blindness occurs.

Treatment, when attempted, has been entirely surgical.

It is expected that, in the near future, preventive operations will be performed on two of our patients, and the results reported.

There is a very curious group of deformities of the skull, due to partial or complete absence of one or more cranial sutures. Of these cases, the best known are those with the so-called tower skull, but this is merely the most marked and characteristic, probably not the most common malformation. These cases are not very rare. During the last two years five or six cases of cranial deformity, due to suture defects, have been recognized in the children's services of Stanford Hospital and Clinic. Consideration of the problems which they have presented has led me to believe that they are of importance, not merely as curiosities of development, but because they present definite potentialities, at present undeveloped; of prevention of blindness, mental backwardness, convulsive attacks, severe and persistent headache, other sequelae of increased intracranial pressure, and severe cosmetic handicap.

True synostosis of the coronal sutures does not normally occur until advanced adult life. The sagittal may close early without causing deformity, but not commonly. In the condition here discussed, the normal suture line is wholly or partly obliterated, the development of the bones follows an abnormal course, and the growth of the skull is deflected by compensatory overgrowth of those portions where the sutures remain open. Thus, if one coronal suture or one-half of the lambdoidal suture is closed, the skull becomes lopsided, with its longest diameter oblique instead of antero-posterior. If both coronals are closed the head becomes brachycephalic, with its antero-posterior diameter shortened. With the sagittal closed, the head becomes long, narrow, boat-shaped, with a peculiar occipital overhang which is quite characteristic. With both halves of the lambdoid closed, the head becomes broad in front and narrow behind. When both the coronal and the sagittal sutures are closed, the head becomes high and tower-shaped by growth upward. In such cases the cranial deformity appears to be the mechanical resultant of the growth and expansion of the brain acting upon a skull which can expand only in cer-

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